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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/583,880	01/03/2007	Yoshihito Maeno	CU-4890 RJS	8758
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EXAMINER				
ANGEBRANDT, MARTIN J				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/583,880

Applicant(s)

MAENO ET AL.

Examiner

Martin J. Angebrandt

Art Unit

1722

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10/7/2010 & 5/26/2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 57-74 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 57-74 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/22)
Paper No(s)/Mail Date 5/26/2010
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

1. The response of the applicant has been read and given careful consideration. Responses to the arguments of the applicant are presented after the first rejection to which they are directed. Rejections of the previous action not repeated below are withdrawn.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 63-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oe et al. JP 2000-109510, in view of Stevenson '409 and Haugh '526.

Oe et al. JP 2000-109510 teaches in example 22 (in table 4) alicyclic epoxy compound, CY-179 (monomer), O-I (p-tert-butylphenyl) Iodonium hexafluorophosphate, D-3 2,5-bis[4-(diethylamino)phenyl methylene] cyclopentanone, 2-methyl-2(p-toluenesulfonyloxy)3-keto butanoic acid t-butyl ester and an acrylate- methyl methacrylate co-polymer which is exposed using the 514.5 nm Ar ion laser. [0044-0047]. The use of these composition in holographic processes is disclosed. [0003,0052]. The use of various cationically polymerizable compounds and combination of these is disclosed. [0023]. The addition of ethylenically unsaturated monomers and binders is disclosed [0028].

Stevenson '409 teaches the duplication/copying of holograms using contact copying using a beam of coherent light (laser) to expose a photopolymeric holographic recording material in contact with a master hologram. In the case of copying a reflection hologram, the master and photopolymer are contacted and the light is incident from the side of the recording material

(reference light) and the reflection from the master hologram corresponds to the object beam [0004].

Haugh '526 teaches the use of either two beams exposure (Example XXXVI) or contact copying methods (example I) for forming volume holograms. Contact copying is much quicker than forming multiple originals and can be used with in expensive incoherent light sources.

It would have been obvious to one skilled in the art to modify the teachings of Oe et al. JP 2000-109510 by using a contact copying process such as that taught by Stevenson '409 to save time in forming holographic duplicates with a reasonable expectation of success based upon the teaching of Haugh '526.

The addition of Haugh and Stevenson address the limitation added to the claims, specifically, the use of a photopolymer with a reflection holographic contact copying configuration. The examiner is unclear how the applicant recognized that the copying process was taught in the Laganis reference as a holographic copying technique (response at page 10), yet came to the conclusion that the process would be unobvious.

The compound D-3 and the compound of claim 63 are the same compound (benzylidene is a different name for phenylmethylene).

4. Claims 63 and 65-68 are rejected under 35 U.S.C. 102(b) as being fully anticipated by Keys et al. '102, in view of Monroe '790, Stevenson '409 and Haugh '526

Keys et al. '102 teaches in example 55, the use of a 514 (the emission line is actually 514.5 nm) from an argon ion laser in a composition if Vinac (PVAc binder), Photomer (acrylate monomer), SR-349 (diacrylate monomer), TBPM (methacrylate monomer), HABI (photoiniator, MMT, FC and JAW (sensitizing dye) which after processing including heating forms a hologram

which replays at 508 nm with a diffraction efficiency of 98%. (9/15-51,19/3-48,34/57-35/20).

Useful bis(p-dialkylaminobenzylidene)ketones are disclosed by Baum 3,652,275) and include DEAW, DMJDI, and DBC (9/15-25, 8/62-9/52). Compositions 14-20 are similar, but use DEAW (cyclopentanone, 2,5-bis{[4-(diethylamino)-phenyl]methylene} (1912-13) as the sensitizer. The use of the media with a 488, 514 (514.5) or 645 nm laser is disclosed (15/62-64). The formation of reflection holograms by passing the reference beam through the holographic recording materials and having an object reflect the light back to the medium (beam traveling in the opposite direction) so the beams interfere. (2/3-36).

Monroe '790 establishes the absorption maxima and absorptivity of these sensitizing dyes (col 15).

Compound	λ_{max}	ϵ_{max}	488	6915
DBC	481 nm	\$9,200	\$1,400	7,200
DEAW	477 nm	74,000	\$1,200	2,100
DMJDI	442 nm	\$1,400	6,900	0
JAW	499 nm	\$9,600	\$1,600	22,300

The holographic recording compositions using DEAW are anticipated by the examples, but their use with a 514.5 nm laser is not. The examples using JAW and the 514.5 nm argon ion laser line anticipate the composition claims and method claims rejected under this heading.

The applicant argues that the compound D-3 has a different absorption form the claimed compound. It may be that the measurements were made in different solvents, but the applicants position is untenable as **the compound D-3 and the compound of claim 46 are the same compound (benzylidene is a different name for phenylmethylene)**. The rejection stands.

It would have been obvious to one skilled in the art to modify the teachings of Keys et al. '102 by using a contact copying process such as that taught by Stevenson '409 to save time in

forming holographic duplicates with a reasonable expectation of success based upon the teaching of Haugh '526 and the teachings of Keys et al. '102 in column 3 and Monroe '790 establishes the absorption maxima and absorptivity of these sensitizing dyes.

The addition of Haugh and Stevenson address the limitation added to the claims, specifically, the use of a photopolymer with a reflection holographic contact copying configuration. The examiner is unclear how the applicant recognized that the copying process was taught in the Laganis reference as a holographic copying technique (response at page 10), yet came to the conclusion that the process would be unobvious.

5. Claims 63 and 65-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Keys et al. '102, in view of Monroe '790, Stevenson '409, Haugh '526 and Baum et al. '275.

Baum et al. '275 is referred to by Keys et al. '102 for the teachings of sensitizers. The general formula is presented in column 2 and R₁ or R₂ can be hydrogen or C1-4 alkyl. (2/15-34).

It would have been obvious to one skilled in the art to modify contact copying embodiments rendered obvious by the combination of Keys et al. '102, in view of Monroe '790, Stevenson '409 and Haugh '526 by using the 514.5 nm laser taught at 15/62-64 of Keys et al. '102 with a reasonable expectation of success based upon DEAW having significant absorption (molar absorptivity) between 488 and 532 nm as evidenced by Monroe '790 and further to use 2,5-(bis(4-butylaminobenzylidene)cyclopentanone in place of DEAW based upon the disclosure of the general formula in Baum et al. '275 and the direction to this in Keys et al. '102 for these teachings.

The applicant argues that the compound D-3 has a different absorption form the claimed compound. It may be that the measurements were made in different solvents, but the applicants position is untenable as **the compound D-3 and the compound of claim 46 are the same compound (benzylidene is a different name for phenylmethylene)**. The rejection stands. The butyl analogue is obvious in view of Baum.

6. Claims 63-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Keys et al. '102, in view of Monroe '790, Stevenson '409, Haugh '526 and Baum et al. '275, further in view of Asakawa et al. '598.

Asakawa et al. '598 teaches the use of dyes, such as cyclopentanones, diphenyliodonium salts or combination of these salts and dyes. (19/28-30) 2,5-(bis(4-ethylaminobenzylidene) cyclopentanone is used in an example (20/30-31). The use of holographic recording is disclosed (col 19)

It would have been obvious to one skilled in the art to modify the processes rendered obvious by the combination of Keys et al. '102, Monroe '790, Stevenson '409, Haugh '526 and Baum et al. '275 by using other photoinitiators, such as diphenyliodonium salts taught by Asakawa et al. '598 as useful with cyclopentaone sensitizers for sensitizing photopolymerizable composition useful for holographic recording with a reasonable expectation of success based upon this teaching within the art.

7. Claims 57 and 59-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Laganis et al. EP 437259, in view of Stevenson '409 and Haugh '526.

Example 5 in table 1 teaches a composition (page 15) comprising Squarilium dye 3, HABI (photoinitiator), TMAB, 9-vinylcarbazole (monomer), sartomer (monomer, photomer

(monomer), Vinac (binder) exposed using a 633 nm HeNe laser to form a hologram with a refractive index modulation of 0.033 (pages 6 and 14-15). The general formula of the dye 3 is provided on pages 2 and 3 and R_2 and R_4 can be C 1 to 7 alkyl. Example 12 in table 2 is similar but records using 647 nm (Kr ion laser). The formation of reflection holograms by passing the reference beam through the holographic recording materials and having an object reflect the light back to the medium (beam traveling in the opposite direction) so the beams interfere. (11/39-43).

It would have been obvious to one skilled in the art to modify the composition of example 5 by using a similar dye with different N substituents (heptyl, in place of methyl) based upon the disclosure of equivalence in the formula. The length or the alkyl chain would not be expected to change the absorption significantly, noting that it is shown to be useful with 647 nm laser radiation for recording a hologram and to modify the process by replacing the mirror used in the recording process with a hologram to form a copy of the hologram as taught by Stevenson '409 to save time in forming holographic duplicates with a reasonable expectation of success based upon the teaching of Haugh '526 and the teachings of Laganis et al. EP 437259 in column 3 and Monroe '790 establishes the absorption maxima and absorptivity of these sensitizing dyes.

The applicant argues that the structure is different than that the squarilium dye of claim 40, which is admitted (the rejection is a 103, not a 102), but that compound is the N-heptyl analogue of the compound used in the cited example and the use of C1-7 alkyl moieties as the N substituents is rendered obvious at pages 2-3.

8. Claims 57-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawabata et al. '340, in view of Harada et al. JP 01-287105, Stevenson '409 and Haugh '526.

Kawabata et al. '340 in example 24 uses dye 4 (15/12-13) with a cationically polymerizable compound, a free radically polymerizable monomer, a diphenyliodonium salt, and a binder (P-1) and uses 632.8 nm light to record a hologram (12/16+ and). Other cyanine sensitizing dyes are disclosed, such as those taught by JP 01-287105 and dye 2-[[3-allyl-4-oxo-5-(3-n-propyl-5,6-dimethyl-2-benzothiazolidene)-ethylidene-thiazolidene]methyl]-3-ethyl-4,5-diphenylthiazolinium iodide.

Harada et al. JP 01-287105 teaches various counterions/anions for the dyes for formula A (page 1) including halides, tetrafluoroborate, hexafluorophosphate, perchlorate, methylsulfate and toluenesulfate (page 2/lower left column). Specific examples of dyes bounded by A are illustrated the lower right column of page 4 (note dye A-3). These are disclosed as useful in sensitizing onium salts. (abstract and formula III on page 3).

It would have been obvious to one skilled in the art to modify the medium of example 24 of Kawabata et al. '340, by using another disclosed dye, such as 2-[[3-allyl-4-oxo-5-(3-n-propyl-5,6-dimethyl-2-benzothiazolidene)-ethylidene-thiazolidene]methyl]3-ethyl-4,5-diphenylthiazolinium but with a different counterion with a reasonable expectation of success based upon the disclosure of equivalence in the references and to modify the recording process using contact copying process to form a copy of the hologram as taught by Stevenson '409 to save time in forming holographic duplicates with a reasonable expectation of success based upon the teaching of Haugh '526 and the teachings of Kawabata to the formation of reflection holograms.

The applicant argues that the dye 4 of 1,3,5-thiadiazolidene ring which is different form that of the claim. This is admitted as the rejection is a 103 rejection and not a 102 rejection, but

the applicant does not address the dye 2-[[3-allyl-4-oxo-5-(3-n-propyl-5,6-dimethyl-2-benzothiazolidene)-ethylidene-thiazolidene]methyl]3-ethyl-4,5-diphenylthiazolinium iodide taught at 5/18-19, which is the same dye as in the claims (the naming differs only in the order of recitation). The dye is used with 632.8 nm laser.

9. Claims 69-74 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okubo et al. '324, in view of Ernst et al. DE 100571141, Yamaguchi et al. JP 06-175554, Stevenson '409 and Haugh '526.

Okubo et al. '324 in example 21 teaches a composition of dye D-22 (see col 11-12), a photoinitiator, acrylates, an iron arene initiator. (19/65-20/25). Sample 14 teaches this is an iodonium salt (col 21-22) See 14/40-47 for iodonium salts. These can be used with 488 or 532 nm lasers (2/40) and for holography (1/18). Useful terminal moieties are disclosed. (col 4).

Ernst et al. DE 100571141 teaches various 2,4,6,-pyrimidinetrione compounds bounded by the formula I for sensitizing photopolymerizable compositions. Y can be S or O, X can be methylene, oxygen, or sulfur and R2 and R3 can be hydrogen, methyl or ethyl and R1 and R5 can be alkyl. (abstract and page 3/lines 1-16). These are useful in the 370-430 nm range.

Yamaguchi et al. JP 06-175554 in example 1 teaches a rhodanine dye, PMMA, an acrylate, and an iodonium salt photoinitiator which was coated and exposed to 488 nm laser light to form a hologram with 70% diffraction efficiency.[0044-0046] In examples 2-4, the 488 nm laser was used. [0047]. 514 and 633 nm lasers were also used. (see table)

To address the embodiments using compound 5 of the claims, the examiner cites Ernst et al. DE 100571141 and holds that it would have been obvious to modify the cited compositions of Okubo et al. '324 and processes using them by using other similar

pyrimidinetriene compound known to sensitize photopolymer composition, such as those of Ernst et al. DE 100571141 with a reasonable expectation of successfully forming a photopolymerizable composition and recording a hologram therein with a blue laser and cites Yamaguchi et al. JP 06-175554 to establish that the use of similar rhodanine dyes to sensitize iodonium salts in holographic recording systems to 488 nm lasers is known and provide support for a reasonable expectation of success. Additionally, it would have been benzothiazolyl moieties based upon the leftmost structure at 4/25, dye D-17 and where Y is sulfur 4/38) and to modify the recording process using contact copying process to form a copy of the hologram as taught by Stevenson '409 to save time in forming holographic duplicates with a reasonable expectation of success based upon the teaching of Haugh '526 and the teachings of Yamaguchi et al. JP 06-175554 to the formation of reflection holograms.

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

See Smith '099 at col. 3/lines 36-54 for embodiment where mirror acts as object.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin J. Angebrannt whose telephone number is 571-272-1378. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kelly Cynthia can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Primary Examiner
Art Unit 1722

/Martin J Angebranndt/
Primary Examiner, Art Unit 1722
November 18, 2010